



Top 5 Software Capabilities for Ensuring Food Safety

How can manufacturers minimize food safety risks?



We've all seen the headlines:

Salad products and ground beef recalled. Contaminated peanut butter. Metal fragments in cereal. Undeclared allergens in ice cream. Salmonella found in eggs and tomatoes. Melamine in milk. And so on...

Food safety concerns continue to be at the forefront of public attention, which have led to high-profile product recalls. In today's age of globalization, ever-increasing consumer awareness and evolving government regulations, there is a legitimate urgency among manufacturers to take more ownership for food safety to protect consumers and their brands.

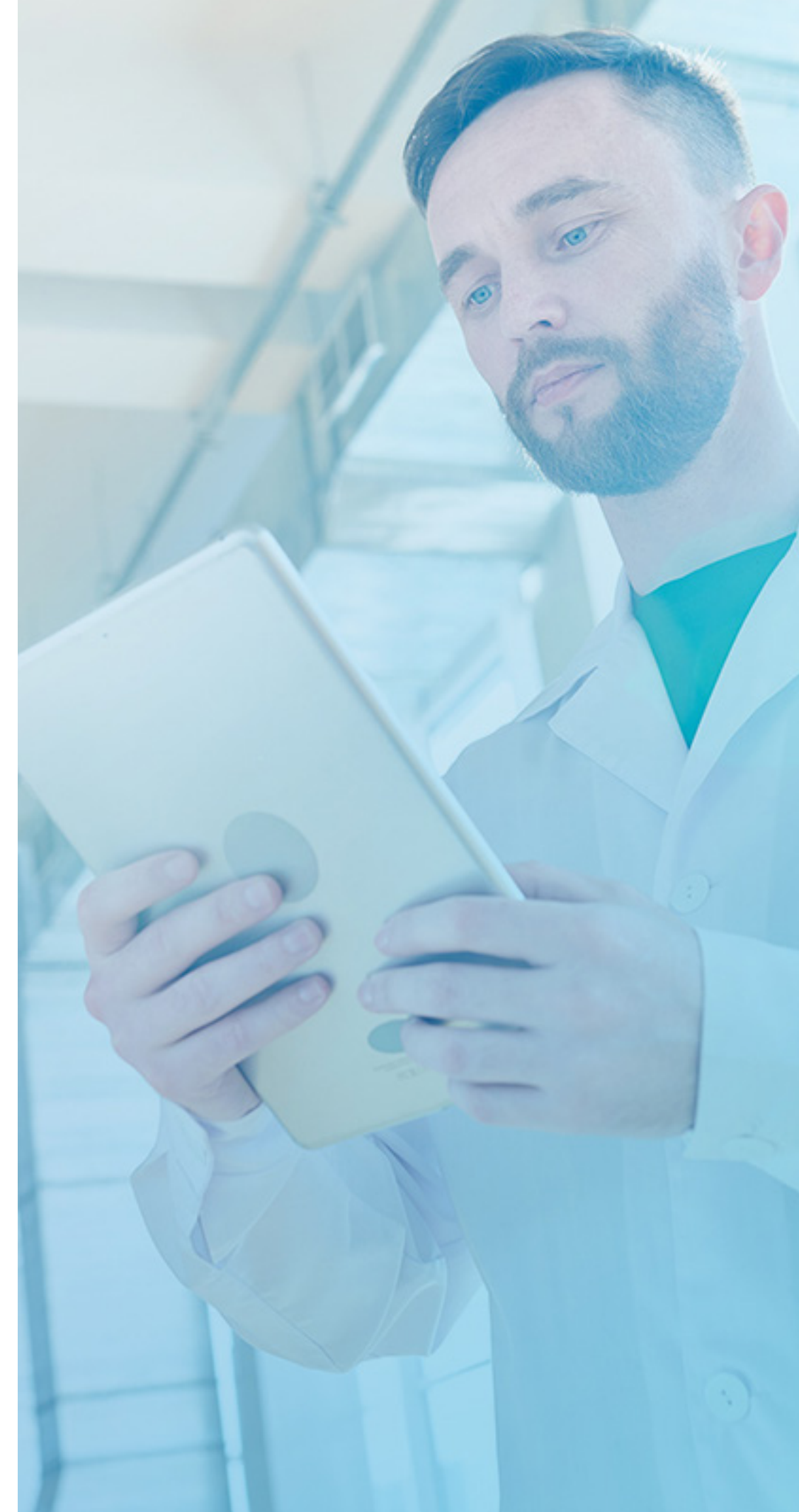
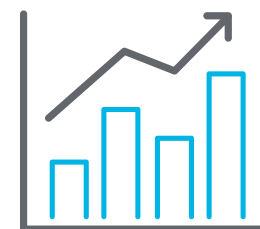
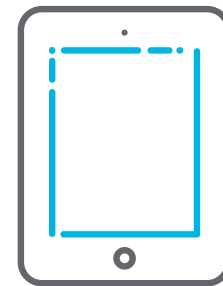
Let's explore the fully integrated, Internet-of-Things enabled, end-to-end software capabilities that are fundamental as part of a manufacturer's food safety approach to optimize quality and minimize risk for prevention. Forward-looking manufacturers that develop and implement solid, integrated strategies with the right technologies can consistently deliver high product quality, which in turn, drive productivity savings.



Prevention as the core goal

Until recently, many food manufacturers focused much of their efforts on minimizing the impact of a recall if it occurred by ensuring swift response and communications. Identifying and isolating tainted products through traceability and managing “damage control” were the key goals to avoid any further potential harm to consumers and to minimize the impact of lost profitability and negative publicity.

While response and communications to recalls are still critical, the primary focus needs to shift toward the prevention of recalls—building safety upfront before products reach consumers. There’s a real opportunity for manufacturers to improve food safety during production with critical software capabilities that leverage real-time actionable knowledge and provide insight and analytics for enhanced control and consistency.



A comprehensive, integrated approach

Regulatory agencies and retailers around the world are increasing their focus and requirements for preventative strategies, and food safety and quality programs are placing greater emphasis on better processing practices, escalating initiatives surrounding quality. It requires a holistic, integrated plan that allows for more control across production and closer collaboration between other key stakeholders in the food industry—including suppliers, producers, academia, regulators, and consumers.

A comprehensive approach that targets risks and ensures food safety through real-time operational intelligence, trending capabilities, rich analytics, electronic standard work practices, and powerful traceability helps you gain the deep operational insight needed across production.



Integrating all of these capabilities allows you to predict when issues are likely to occur and proactively take real-time corrective action when the process digresses from specifications—ensuring consistent high quality

and food safety, which in turn, tie into productivity savings. We have seen time and again that manufacturers that improve their quality and food safety also drive greater operational productivity.

Improving quality and food safety leads to higher productivity—a critical advantage that's imperative for manufacturers to stay ahead in today's highly competitive environment.

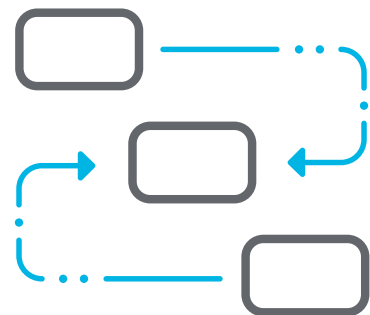


Critical software capabilities

Real-time, mobile intelligence enables anywhere, anytime decision making

In today's mobile environment, it's imperative to deliver relevant information to operators and other key decisions makers from wherever they are. Whether they're on the plant floor or offsite, the ability to receive real-time information and notifications through a mobile device such as an iPad® or smart phone enables them to respond immediately to critical events—increasing productivity and minimizing the risk of safety mishaps.

Software that delivers real-time operational intelligence puts the right information in the right hands—providing key decision makers with contextualized information based on their role and location for better, faster decision making. It helps address the challenge of making sense of the myriad of data available in today's operations and significantly improves the way industrial operations work from the plant floor.



Trending and analytics help eliminate the root cause of product risk

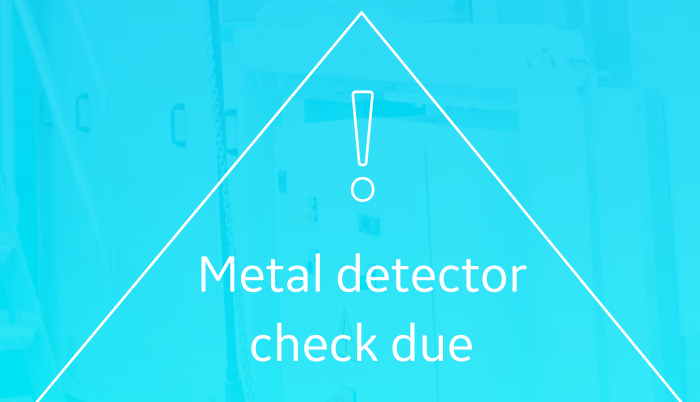
At the heart of preventing recalls is the ability to proactively recognize production trends as they happen and take immediate corrective action as needed. This requires you to shift away from looking solely at historical data and instead to connecting it to real-time production information. Software with sophisticated trending and analytics capabilities can help you effectively identify trends and gain detailed insight into the operation of plants, including root-cause relationships, so you can make crucial quality improvements that mitigate risks as they occur.

For example, temperature trending led one food manufacturer to discover that its oven temperatures were not consistently being met for its product, increasing product safety risk and requiring corrective action.

Trending data provided the critical intelligence needed during the process before it reached the failure limit, enabling operators to adjust the ovens “on the fly” to compensate for the temperature drifts and ensure product safety.

Access to real-time and geo-intelligent information and data enables operators to make better, faster decisions across the manufacturing plant before problems arise.

Real-time operational intelligence provides operators with information critical to their role.



Prevention as the core goal

Understanding patterns and relationships between various sets of data such as temperatures, speeds, pH levels, and humidity—rather than compartmentalizing potentially at-risk products using post-production testing—can help eliminate the true root cause of product risk. Measured against food safety metrics, trending with real-time notifications of process upsets can help manufacturers identify and address small issues before they escalate into bigger problems.

Predictive analytics can prevent quality issues before they occur

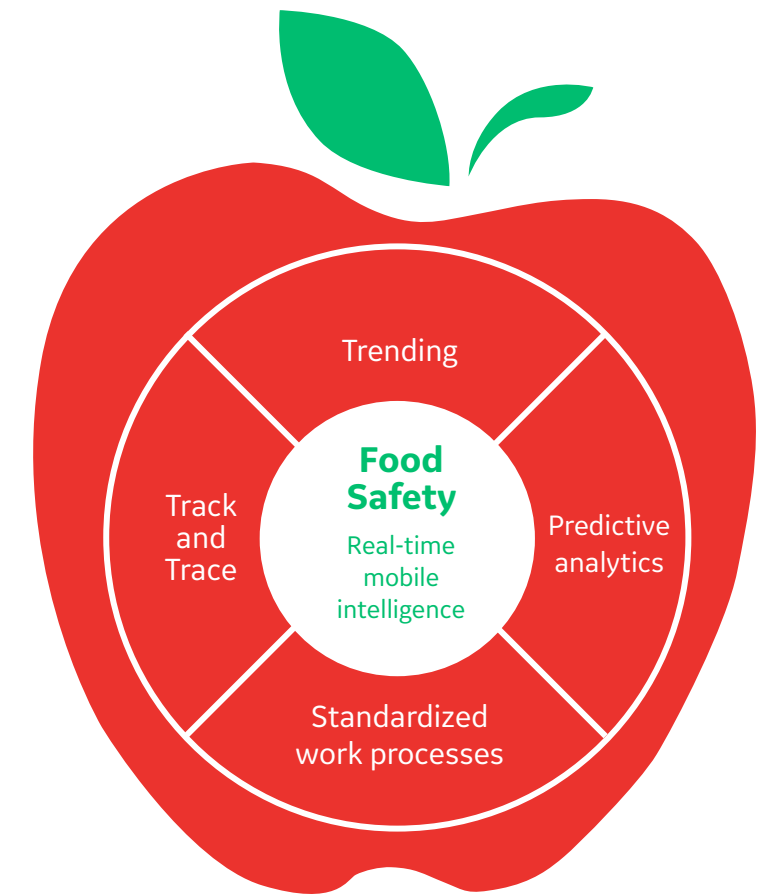
Real-time predictive analytics are vital to help you understand what could happen based on trends or if there are parameter changes, providing critical decision support to foresee issues before an event occurs. Advanced software with predictive analytics may leverage robust modeling engines and multivariate analysis to preempt alarm and failure events based on historical models—enabling “active avoidance.”

Analytics provide an opportunity to correct the problem that is about to occur, which can help prevent quality issues. Take high pH readings in a key processing step, for example, which can compromise product quality; if the pH level starts deviating toward a critical condition, predictive analytics software can extrapolate the scenario in real time and determine that a critical condition is likely by using a process model built on past scenarios and process knowledge.

The software can use the process model to identify and quantify what the major causes for the pH deviation are and alert the operator with actionable knowledge in real-time. He or she can then acknowledge the condition and causes, and adjust the process to prevent the critical condition from occurring. Such a solution can also support collaborative knowledge sharing by adopting operator knowledge into the software’s real-time engine, enhancing the ability to predict impactful events and alarms.

In a real-case scenario, a dairy company in the U.S. used predictive analytics software to reduce spoilage in its dry baby formula product.

It discovered that its drying process could have better control; by looking at content moisture, dry time and several other parameters, it was able to predict the moisture content of



its product and reach the desired state faster with a better success rate while providing more consistency for the parameters that reduce spoilage.

Standardized work processes help minimize inconsistencies

The centerpiece of any good safety program is standard operating procedures (SOPs), which help ensure that operators consistently adhere to recipes and comply with Hazard Analysis and Critical Control Points (HACCP).

Industrial workflow or work process management software enables manufacturers to digitize manual and automated work processes, instead of relying on static paper trails or a binder at an operator station. Addressing the need for better operator guidance, digitization helps them follow SOPs and work instructions with greater precision and fewer errors.



Workflow software is a powerful tool because it electronically guides operators through step-by-step instructions. You can ensure that production complies with defined processes—through validated entry—capturing data for analysis and historical records. It can help automate and manage HACCP monitoring, integrating production work processes with real-time HACCP testing, and enabling faster response to compliance issues.

Furthermore, workflow software with mobile alarm response management helps you:

- Automatically and dynamically respond to production problems and events, while monitoring alarms and out-of-spec conditions from multiple systems
- Track HACCP data in real time and automatically adjust work processes to meet specification requirements
- Improve production processes for increased food safety

Traceability enables tighter controls across the supply chain

Many variables can affect the availability and reliability of data on the plant floor and throughout the supply chain, which can be difficult to track and trace. While most solution vendors apply traceability solely for minimizing the impact of recalls after they occur and aiding customer complaint investigations, manufacturers that instead use traceability information to improve food safety can work to prevent recalls.

Software that offers rich traceability capabilities allows you to trace a product throughout every step of the manufacturing process and identify its exact materials and quality characteristics. It allows you to control the flow of product between equipment and manage in-process inventories in real time with greater transparency, and hence safety, between production orders.

You can leverage such software to integrate data and trace the complex batches, continuous processes, sub-processes, components or by-products, so you know the origin and destination of all incoming materials and outgoing finished goods—improving food safety by leveraging raw material intelligence. By tracing raw materials to finished product, you can establish tighter controls to safeguard the supply chain.

Industrial workflow software can help manage a HACCP plan and sampling by automatically triggering HACCP sampling based on production events or elapsed time, and provide operators with work instructions that connect production actions with real-time quality data.



A food producer in Europe used traceability to gain a better understanding of the effect a raw material had on its product. Although the shipping temperature fell within the specification, traceability revealed that a variation in the shipping temperature of the raw material had an ill effect on its finished product. Therefore, by focusing on this parameter and working with the raw material supplier, the producer was able to tighten control and increase product safety.

The power of integrated capabilities

With prevention as the core goal, each of the five critical software capabilities discussed plays a distinct role in minimizing food safety risk. Leveraging all five capabilities—as opposed to one or a select few—provides the most advantage as the insight gained from each becomes exponentially more powerful as it builds on the intelligence provided by the other critical capabilities.

Each component enables you to gain a more holistic view into the factors that impact food safety and to take a proactive approach that targets specific risks—ensuring the highest level of quality throughout production, even prior to when materials reach the production facility.

Minimize food safety risks

- Put the right information in the right hands at the right time with real-time, mobile operational intelligence
- Proactively recognize data trends and understand patterns and relationships
- Leverage real-time notifications of process upsets for immediate corrective action
- Identify process deviations and predict issues before they occur to enable “active avoidance”

Enhance process control and consistency

- Digitize automated and manual work processes
- Enable faster, more accurate responses to compliance issues
- Control product flow with greater transparency and trace raw materials back to their origins

Are you ready to take the next step?

With increasing awareness of food safety issues and globalization of the food chain, consumers, retailers, and regulatory agencies are demanding ways to ensure safer food. The focus for manufacturers is shifting from response to prevention, and the need to optimize product quality and minimize food-borne hazards across production and the supply chain is greater than ever before.

Only by establishing a holistic, integrated strategy with the right set of software capabilities can you leverage the critical insight, consistency, and transparency needed to identify and address potential food safety issues while products are still within the factory walls. Technology is a critical enabler for tighter real-time controls to help safeguard processes and prevent quality issues—increasing consumer confidence and protecting your product brand.

Set the right food safety strategy that focuses on prevention. Let GE Digital help you build a safer, more profitable food production environment.

One global pet food manufacturer realized savings of more than \$200,000 annually on a single SKU in one plant by leveraging the latest software capabilities. Addressing its need for better visibility into its operations to drive quality and efficiency, the manufacturer implemented GE Digital's Proficy software, which provided productivity and quality data by SKU on the lines from all shifts.

As a result, operators could make decisions such as formula adjustments based on real-time operational intelligence and input information at the point of production—ensuring consistent high quality and food safety.

Key benefits:

- Increased uptime, reliability and productivity
- Cost savings of \$0.01 per case on one SKU
- Cost reduction of \$200K+ per year on one SKU in one plant
- Greater overall equipment effectiveness (OEE)





Our Food & Beverage solutions are based on mitigating the issues that face manufacturers today, including rising costs of raw materials and packaging, increasing complexity and consumer demand, changing workforce and expanding regulations in food safety and quality.

About GE

GE (NYSE: GE) is the world's Digital Industrial Company, transforming industry with software-defined machines and solutions that are connected, responsive and predictive. GE is organized around a global exchange of knowledge, the "GE Store," through which each business shares and accesses the same technology, markets, structure and intellect. Each invention further fuels innovation and application across our industrial sectors. With people, services, technology and scale, GE delivers better outcomes for customers by speaking the language of industry.

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